FINAL DRAFT

INVASIVE SPECIES AND CLIMATE CHANGE

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ISSUE

Climate change interacts with and can often amplify the negative impacts of invasive species. These interactions are not appreciated or fully understood. They can result in threats to critical ecosystem functions on which our food system and other essential provisions and services depend as well as increase threats to human health. The Invasive Species Advisory Committee of the National Invasive Species Council recognizes the Administration's commitment to dealing proactively with global climate change. We applaud the Department of Interior's establishment of a Climate Change Response Council to synthesize data and coordinate appropriate management of our nation's lands and waters. We also acknowledge the United States Department of Agriculture's (USDA) recent presentation of the impact of climate change in its publication: "*Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States."* We fully support the Department of Commerce's National Oceanographic and Atmospheric Administration's (NOAA) proposal to establish the NOAA Climate Service to meet essential national needs. However, it is critically important that we now redouble our efforts and proactively take account of the interaction between climate change and invasive species.

DECISIVE ACTION IS REQUIRED

Policy makers at all levels of government must integrate invasive species considerations into climate change policies. The strong interrelationships between climate change and the dynamic nature of invasive species, changing ecosystems, and human activities necessitates such integration. It is critical that practices be developed that strengthen environmental monitoring, management and control of invasive species to minimize impacts on the broad range of ecosystem resources upon which humans depend. The physical process of climate change interacts with the biological and physical processes of the earth's ecosystems, and these are in turn linked to the socio-economics of human activities.

BACKGROUND

Climate change and biological invasions are dynamic, interconnected and interdependent phenomena. They affect human health and well being through their impact on resources and goods and services provided by ecosystems. These ecosystems, in turn, are critical to agriculture and forestry, food security, water supplies and other natural resources. They affect wildlife, recreation, and public health and safety nationwide. Even without climate change, invasive species have repeatedly and rapidly disrupted many American ecosystems. The ongoing change in climate and the expected speed of this change are likely to exacerbate problems by increasing the ability of invasive species to become established in, spread through, and disrupt ecosystems. In turn, the speed of ecosystem change can be dramatically increased by the introduction of invasive species. At a minimum, invasive species can reshuffle the landscape for agricultural services and resources including food, fuel, feed, fiber and forests along with quickly changing land use decision pressures. As a parallel, in marine ecosystems, climate change can induce fisheries collapse as mid-trophic structure species are lost or framework corals disappear,

opening new potential niches for tolerant invasive species. Finally, climate induced shifts in invasive disease vectors, such as those for malaria or avian flu are of increasing concern.

As plant communities shift in response to climate change, many of the animal species that depend on the plants are likely to shift as well, with subsequent effects on ecosystem function. If climate disruption increases the opportunities for invasive species to establish, due to the speed of the change, then the ecosystem services will change accordingly. Invasive species can alter the composition of plant communities and change their structure and function over large areas. Changing land cover can in tern influence weather and climate. In some regions, both climate change and invasive species are likely to increase the frequency of wildfires which in turn will further facilitate the establishment of fire adapted invasive species leading to even more frequent and intensive fires. Climate change may also alter the efficacy of management strategies for invasive species. Invasive species may respond more positively to increased carbon dioxide levels than most cash crops. In some cases, glyphosate herbicide can lose efficacy on weeds in increased CO2 levels. Finally, increased CO2 levels can also increase the susceptibility of some crop plants to invasive pests.

Increased climate variability favors species that tolerate a wide range of environmental conditions and have high genetic variability, both of which would allow them to adapt to tolerate rapid shifts in environmental conditions. Physical stressors such as extreme weather events, submergence, drought, etc., amplify human disturbance patterns providing conditions for invasive species establishment and spread. As the speed of change increases, increased physical changes may occur to an ecosystem's environment such as water level or changes in salinity or acidity which are especially critical in coastal marine environments. Climate change can also create new pathways for invasion as species are introduced to new areas or the influx of organisms is increased. This might occur with a new shorter trade route such as the opening of an ice-free Northwest Passage which would increase the survival rate of organisms transported between ports and expand the range and number of ports.

We face the prospect of climate change and invasive species threatening basic critical ecosystem functions that provide food and other essentials as well as human health. However, there are steps that can be taken to meet these challenges.

RECOMMENDATIONS

Policy and Legal Responsibilities

Executive Order 13112 requires Federal agencies to address invasive species and establishes the National Invasive Species Council to coordinate planning and response. The International Plant Protection Convention requires analyses of pest risk. Agencies may be able to integrate climate change considerations into their existing risk-assessment protocols and procedures … Environmental laws such as the Endangered Species Act and the National Environmental Protection Act (NEPA) can be used more powerfully to address invasive species.

Opportunities for Action

We call on the member Departments and Agencies of the National Invasive Species Council (NISC) and potential partners to:

- Use the Global Change Research Act of 1990 (GCRA)48 (PL 101-606) to aggregate information about the implications of a changing climate for invasive species spread so scientific data may be synthesized through existing authorities to inform policy-makers.

- Formalize the commitment to address invasive species by codifying the National Invasive Species Council in legislation and the EO13112 definition of invasive species.

Codification will require the Federal response to be coordinated, empowered, and appropriately funded.

- Streamline agency programs to address invasive species effectively and efficiently by establishing: 1) strategic plans that anticipate invasives issues, 2) forward-looking environmental compliance documents (e.g., NEPA, nationwide EIS on invasives prevention, management, and restoration), and 3) awareness programs to anticipate and manage potential ecosystem changes.

- Assess new invasion pathways and strengthen prevention programs to address invasives in ballast water, hull-fouling, interstate and international movement of materials and equipment (e.g., energy development, wildfire response, national defense), and screening of plant and animal imports.

- Support monitoring and adaptive management programs for invasive species at the landscape scale so that natural resource managers can identify new threats and respond quickly and appropriately to invasive species in changing climatic conditions.

- Foster collaboration of existing networks to address the broad geographic nature and altered management of invasive species issues in a time of climate change. This will allow the national response to be coordinated, efficient, and capitalize on current capacities using a synergistic approach.

- Increase research and development targeted at climate change and invasive species by supporting and expanding the USDA-ARS Climate Change program, as well as competitive research programs such as USDA's Agricultural and Food Research Initiative (AFRI), EPA's Project Grants, and NOAA's Sea Grant program. Better understanding of the interaction of climate change and invasive species will result in more relevant prioritization and management on the ground. This includes recognizing the economic basis for invasive species management decisions and supporting work that integrates economic, ecological and biological data providing policy and management support.